

PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Jan ERIKSSON

Serial No. 09/581,911

Filed June 19, 2000

ANIMAL RELATED APPARATUS



Confirmation No. 4412

GROUP 3643

Examiner Andrea M. Valenti

Response
6/27/02
Holmes

RESPONSE

RECEIVED

JUN 27 2002

GROUP 3600

Commissioner for Patents

Washington, D.C. 20231

Sir:

This responds to the Official Action of February 13, 2002.

In order to assess the present invention properly, it should be noted, as general background to the invention, that the present invention relates to milking of cows which are allowed to go loose and find their way individually to one or more stalls arranged for feeding, in which the cows are automatically identified and fed with the aid of a computer connected to the identification and feeding means used.

At milk producers each cow is as a rule milked twice a day. However, research has shown that it is possible to increase the milk production by 15-25% by milking three or even four times per day and this without detriment to the cow.

There is thus now the possibility to influence the milk production positively by additional milking occasions and in

spite of this reduce considerably the need for supervising staff in connection with the milking by utilizing to the greatest possible extent automatically active means for attaching and taking off the milking means and also for other measures associated therewith.

The animals themselves decide when they are to find their way to a feeding stall and milking apparatus, and this decision is entirely voluntarily based. In order not to allow animals to be milked at too short intervals in time, the point in time at which each animal is milked is recorded. In connection with the identification of a cow finding her way to a feeding stall to eat, and provided that a predetermined time has passed after the cow in question was last milked, the apparatus is activated for automatic application of the milking means to the udder of the cow and for starting a milking operation, while the cow is prevented from leaving the stall during milking.

According to the known feeding method each cow is provided with a so-called transponder, i.e. a codable signal emitter attached to a necklace. By the transponders a sensing means placed adjacent the feeding station is actuated and this means is in its turn coupled to a computer which senses which individual is visiting the feeding station and is adapted to dispense or not dispense a certain amount of food on the basis of data concerning the desired food ration and the food amount

earlier consumed by one and the same individual up to that time of the day.

Other features of the milking apparatus are to interrupt the milking process and to initiate automatic removal of the milking means from the cow's udder respectively after the predetermined milking time has expired and/or after the available milk quantity has been milked out. Means for automatic recording of milk quantity and temperature, means for sampling test volumes, for checking with respect to bacterial content, the presence of mastitis (udder infection) and the like, can also be connected to the apparatus.

Plants for automatic feeding of cows in loose-housing systems are used in many places and this invention permits completing such feeding plants so that also milking can be carried out in such plants. The need for specific milking parlors or stations is thus entirely eliminated. For carrying out the method of the invention a specifically combined feeding and milking stall is made, having at its inner end a bowl or the like for the food. Shields are arranged in the stall in an appropriate manner and there are one or more means for retaining the cow.

In the present invention, the voluntary milking system makes the use of the milking apparatus vary over time, the variations depending on the behavior of the herd of animals. Therefore, the exact wear and aging of devices associated with

the milking apparatus will be difficult to foresee and will vary from one milk producer to another.

In prior art milking machines, the wearing out of essential parts is avoided by replacing them with certain intervals in time. However, this may not be necessary yet, or it may be too late depending on the behavior of the particular herd in question, except for being labor intensive. The present invention therefore relates to a method for service of a milking apparatus, the service being carried out in dependence of the true milking frequency of each individual herd of animals to be milked.

Guarantee certificates are based on mutual obligations between the milk producer and the manufacturer of milking machines. The milk producer is obliged to exchange certain parts and devices that are subject to wear and the manufacturer guarantees that the milking apparatus will not cause operational disturbance, unnecessary fall in the production or injure animals to be milked. As previously mentioned, parts to be exchanged include many more than just the teatcup devices of rubber or silicon material.

It is inevitable that a movable teatcup interior to a certain extent will be subjected to wear and repetitive strain injury when used during a predefined period of time. The interior material which is made of a rubber or silicone will deteriorate because of ambient light and aging in general. The

time for exchanging varies from one milking apparatus to another because of the factors such as the stock of animals to be milked and the inclination of the animals to use the apparatus.

The present apparatus is provided with a registering means for registering a cumulative value, such as the running time, the number of pulsations or the amount of milk. Conceivably, a timer is provided for registering the running time of the equipment and a flow meter for registering the amount of milk having passed a filter. Furthermore, the image capturing device and the vacuum source are provided with such registering means in order to register the running time of the respective devices. It is conceivable also to provide associated rubber tubes, pipes containing feeding screws, stall gates, cylinders and valves with rubber packing with registering means correspondingly. The applicability of the invention to all exchangeable parts of the milking apparatus, not only to the rubber parts of the teatcup, is a very important aspect of the invention.

The registering means, either in the form of a timer, which measures the running time of, for example, a pulsator, or a pulsation counter, which counts the number of pulsations generated, improves the safety and reliability of a milking apparatus. It ensures that the farmer, who has invested in a milking apparatus according to the invention, is notified about a necessary maintenance action to be taken before animals run the

risk of being injured because of possible malfunction due to deterioration of material.

This is done by pre-setting the control means with a maximum running time of each component, a maximum number of pulsations of the pulsator or a maximum amount of milk flow through a filter. Before jeopardizing animal safety and well-being, or running the risk of suspension of production due to a malfunctioning milking apparatus, the control means generates a signal that service has to be performed regarding that component or whole apparatus. As an example, the control means generates a signal when a teatcup liner should be exchanged, resulting from the lapse of a maximum running time of the pulsator or a maximum number of pulsations thereof, the maximum time constituting a threshold value.

A prioritization among animal-related devices subjected to this registration and control is not possible. As long as only one device is involved, maintenance control remains a small problem. However, the invention adaptable to a large number of animal-related means for which a cumulative running value is registered and controlled. That large number of animal-related means makes the present invention valuable.

Our specification recites, by way of example, only certain animal-related means, such as driving means, pulsator, teat locating and cleaning means. However, this list of animal-related means can be extended to comprise also milk filters, etc.

by connecting all those animal-related means to a computer, it is made possible to register operation parameters and to control each one of the animal-related means. This makes it possible to obtain a better milk quality and not to harm the cow to be milked.

Reconsideration is according respectfully requested, for the rejections to claims as anticipated by TOMIZAWA et al. or WO 96/36212, or is unpatentable over 96/36212 in view of either HOEFELMAYR et al., FINGER, or VAN DER LELY.

TOMIZAWA et al. is non-pertinent to the present invention. It merely relates to measuring the flow rate of milk and is therefore not relevant to any of the aspects of the present invention as set forth above.

WO 96/36212 describes a method an apparatus for guaranteeing that a teatcup liner of a milking machine opens and closes during a milking operation in a predetermined way. Malfunction during operation is signaled in case the sensed movement of the teatcup liner does not correspond to the predetermined way of movement.

The milking machine described in WO 96/36212 comprises a cluster having a central teatcup receiver 4, i.e. a claw, and teatcups 3. The milking machine is of the conventional type and the teatcups are intended to be manually applied onto the teasts of an animal to be milked. There is no robot described in WO 96/36212. Moreover, neither is disclosed any robot nor other

equipment intended to co-operate closely with the robot, which is the case according to the present invention. Worth mentioning is that a malfunction signal is generated first when the teatcup liner movement does not fulfill predetermined conditions, i.e. the signal is generated first when an operational error has occurred.

The problem to be solved by the present invention is to avoid errors from arising in the first place, i.e. to foresee the maintenance requirements of a milking robot and related equipment before errors occur or exchange spare-parts, such as teatcup liners, in time before problems occur. The solution to this problem is to measure at least one "cumulative running value" to have reached a predetermined value with respect to a certain part in order to exchange it and to determine the value for the particular part to be reached for being exchanged. Hereby, it is guaranteed that the milking robot and the associated equipment are to be operable in a correct manner.

HOEFELMAYR et al. is no more pertinent than TOMIZAWA et al. HOEFELMAYR et al. provides a method for mechanical milk removal with automatic stimulation, for the purpose of achieving maximum milk ability, improved udder emptying, increased lactation output and enhanced work productivity during milking. Thus, HOEFELMAYR et al. might be considered to be no more than a refinement of TOMIZAWA et al. (even though dated earlier), the refinement taught by HOEFELMAYR et al. going in the direction of

improved milk productivity, which is not at all the direction of the present invention.

Similarly, VAN DER LELY may teach the feature for which it was applied; but this feature likewise goes in a different direction from that of the present invention.

FINGER takes the following approach to the problem:

"For many devices, particularly electrically energized devices such as electronic system for communication, or data handling, or navigation control, for instance, it is very desirable to have some means of determining the cumulative operations. The cumulative operations measurements provide a basis for determining when the device or apparatus should be given routine maintenance, or overhaul, or when a complete replacement should be made in order to assure reliability. Such reliability problems are especially important, for instance, in an aircraft."

There are several reasons why a combination of the aforementioned documents cannot be considered to be obvious and thereby negate the patentability of the present invention. WO 96/36212 neither relates to a robot nor mentions anything of a fully automated system. The document signals a malfunction within a milking machine to the operator first when a teatcup liner does not function properly, and therefore there is no planning in advance for maintenance measures or exchange of spare-parts.

The present invention, relating to a milking robot in a milking stall, is intended to co-operate with milking equipment, such as milk filters, teatcups, removers comprising various

driving cylinders, milk sensors, liners, pulsating means, etc. Stall gates with associated driving cylinder arrangements are also included, the gates controlling the animal traffic in and out of the milking stall. The milking is accomplished entirely without human intervention or supervision. Animals are to be treated within the milking stall, and unless driving arrangements are not in proper functionality, the animals may be injured. filters are to be exchanged in due time, so as not to produce milk of poor quality. Teatcup liners must be fresh and periodically exchanged in order to function so as to treat the animal gently and not harm its udder or teats. In case teats are slightly injured, also this may cause udder infections leading to infections, such as mastitis, whereby the milk quality deteriorates. In case the teatcup liners do not function properly, i.e. move from an open to a closed position according to a predetermined movement pattern, the amount of milk generated is not optimized. All these examples lead to a reduced milk production, and since the milk producer strives for a high and evenly distributed milk production without operational disturbance, the present invention is of considerable value and importance within the dairy industry.

When using the present invention in the context of automated milk production, the living animal can be treated leniently without running the risk of being hurt or injured. The quality of the produced milk can be guaranteed as well as the

milk production optimized with respect to both animal health and milk yield.

FINGER discloses an inventive concept which at first glance resembles the present invention. Citing the document: "The cumulative operations measurements provide a basis for determining when the devices or apparatus should be given routine maintenance...". However, nothing is mentioned about the safety of living creatures, optimal milk production or high quality of the milk produced.

A combination of WO 96/26212 and FINGER would thus be inconceivable, since robot milking is not mentioned in WO 96/36212 and the signaling to the operator occurs first when an error has occurred according to the same document.

It is believed that these distinctions are clearly brought out in the claims as they stand. Hence, no amendment of the claims is believed to be necessary.

In view of the foregoing remarks, therefore, it is believed that this application has been placed in condition for allowance, and reconsideration and allowance are respectfully requested.

Respectfully submitted,

YOUNG & THOMPSON

By



Robert J. Patch
Attorney for Applicant
Registration No. 17,355
745 South 23rd Street
Arlington, VA 22202
Telephone: 521-2297

June 13, 2002